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EXAMINER	
GEBREYESUS, YOSEF	

ART UNIT	PAPER NUMBER
4183	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/534,956	KOHL ET AL.	
	Examiner	Art Unit	
	YOSEF GEBREYESUS	4183	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *4/27/2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 April 2007* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/29/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to because Figure 1 shows two gas cavities, one above the substrate layer and one below the substrate layer. The line that connects the gas cavity, the substrate layer and the MEMS structure needs to be removed. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

The barrier layer 20 (paragraph [0028]) need to be corrected 120.

The air cavity 616 (paragraph [0052]) need to be corrected to 612.

The sacrificial material 105 (paragraph [0053]) need to corrected to 325.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5 and 13 are rejected under 35 U.S.C 102 (b) as being anticipated by Benzel et al. (US 6,803,637).

Regarding claim 1, Figure 1c of Benzel et al. teaches a micro electro-mechanical device 60 (col. 5, lines 4-10) formed on a substrate layer 10; and a protective structure 30 and 75 protecting at least a portion of the micro electro–mechanical device, where in the protective structure is formed on the substrate layer and surrounds a gas cavity (cavity) 50 enclosing an active surface of the micro electro-mechanical device, the protective structure being solid.

Regarding claim 2, Figure 1c of Benzel et al. teaches the substrate layer 10 comprises silicon material (col. 4 line 13).

Regarding claim 3, Figure 1c of Benzel et al. teaches the substrate layer 10 comprises non-silicon material (germanium) (col. 7 lines 52-53).

Regarding claim 4, Figure 1c of Benzel et al. teaches the protective structure 30 and 75 comprises a metal material (col. 4 lines 64-66).

Regarding to claim 5, the limitation "is deposited by sputtering" is merely product-by-process limitation that does not structurally distinguish the claimed invention over the prior art. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe,* 227 USPQ 964, 966.

Regarding claim 13, Figure 1c of Benzel et al. teaches wherein the protective structure 75 has not been performed before being applied to the substrate 10 (col. 4 lines 63-66) (formed by deposition).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benzel et al. in view of Cheung (US 6,936,494).

Regarding claim 6, Figure 1c of Benzel et al. teaches all the claimed inventions as applied to claim 1 above. Benzel et al. doesn't teach the protective structure 30 and 75 comprises an overcoat polymer material. Figure 2 of Cheung teaches micro electro-mechanical device where in the protective structure 34 comprises an overcoat polymer material (polyamide) (col.7 lines10-11). Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. with the teachings of Cheung to form an overcoat protective layer with polymer material for the purpose of protecting the device.

Regarding claim 7, the limitation "is deposited by spin-coating" is merely product-by-process limitation that does not structurally distinguish the claimed invention over the prior art. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe,* 227 USPQ 964, 966.

Regarding claim 8 and 9, A further difference between Benzel et al. and the claimed invention is that Benzel et al. doesn't teach an additional protective structure surrounding the overcoat polymer comprising a metal material. Figure 4 of Cheung teaches micro electro-mechanical device 24 where an additional protective structure (support layer and sealing layer) 38 and 46 comprises a metal material. Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al.

with the teachings of Cheung to form a metal protective structure over the polymer material for the purpose of sealing the cavity.

Claims 10-12, 15-20, 24-28, and 30-32 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Benzel et al. in view of Barth et al. (2006/0014374).

Regarding claim 10 -12, Figure 1c of Benzel et al. teaches all the claimed inventions as applied to claim 1 above. Benzel et al. does not teach the protective structure comprises a modular polymer permeable to the decomposition gases produced by the decomposition of a sacrificial polymer while forming the gas cavity free of residue and vacuum-packed. Figure 1G of Barth et al. teaches in a semiconductor process, a silicon wafer 100 where in the protective structure (covering layer) 124 comprises a modular polymer that includes the characteristic of being permeable (paragraph [0062]) to the decomposition gases produced by the decomposition of sacrificial polymer 112 while forming the gas cavity 128 (paragraph [0062]) lines 6-7) substantially free of residue (paragraph [0020] lines 17-20) and vacuum packed (paragraph [0028] lines 1-5). Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. with the teachings of Barth et al. to form a protective modular polymer that is permeable

to the decomposition of a sacrificial polymer while forming the gas cavity substantially free of residue and vacuum packed for the purpose of reducing processing steps and forming residue free structure.

Regarding claim 15, 16 and 18, Figure 1c of Benzel et al. teaches a micro electro-mechanical device 60 formed on a substrate layer; and a gas cavity 50. Benzel et al. does not teach thermally decomposable photo definable polycarbonate material sacrificial structure formed in to a cavity enclosing an active surface. However Figure 1f of Barth et al. teaches in silicon microelectronics a thermally decomposable sacrificial structure 112, where in the sacrificial structure is formed into gas cavity where the sacrificial structure comprises photo-definable polycarbonate (paragraphs [0030] and [0031]]) material. Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. with the teachings of Barth et al. to form a photo-definable polycarbonate thermally decomposable sacrificial structure protecting at least the portion of micro electro-mechanical device, wherein the sacrificial structure is formed into a gas cavity enclosing an active surface for the purpose of reducing process step and forming residue free cavity.

Regarding claim 17, the limitation "is deposited by spin-coating followed by pattering" is merely product-by-process limitation that does not structurally distinguish the claimed invention over the prior art. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim

is unpatentable even though the prior product was made by a different process. *In re Thorpe,* 227 USPQ 964, 966.

Regarding claim 19, the limitation is "dispensed by a syringe dispensing tool" is merely product-by-process limitation that does not structurally distinguish the claimed invention over the prior art. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe,* 227 USPQ 964, 966.

Regarding claim 20, Figure 4c of Benzel et al. teaches the sacrificial structure 100 comprises non photo-definable material oxide (col. 6 lines 4-6).

Regarding claim 24, Figure 1b and 1c of Benzel et al. teaches forming a protective layer 30 (col. 4 lines 35-40), gas cavity 50. Benzel et al. does not teach forming thermally decomposable sacrificial layer on a substrate where in decomposed molecules of the sacrificial layer permeate through the protective layer forming a gas cavity. Figure 1E of Barth et al. teaches forming a thermally decomposable sacrificial layer 112 on a substrate 100, forming thermally decomposing the sacrificial layer (paragraph [0040]), wherein decomposed molecules of the sacrificial layer permeate through the protective layer, and where in a gas cavity 128 is formed where thermally decomposable sacrificial layer was formed (paragraph[0062] lines1-3). Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. with the teachings of

Barth et al. to form a gas cavity using thermally decomposing sacrificial layer for the purpose of forming residue free cavity.

Regarding claim 25, Benzel et al. teaches all the claimed inventions as applied to claim 24 above. Benzel et al. does not teach the method of depositing sacrificial layer. Figure 1B of Barth et al. teaches applying a solution in a silicon wafer 100 to form a layer 102 by using a spin coating technique (Paragraph [0056]). Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. with the teachings of Barth et al. to form a sacrificial layer by using a spin coating method for the purpose depositing the sacrificial layer.

Regarding claim 26 , Benzel et al. teaches all the claimed inventions as applied to claim 24 above. Benzel et al. teaches the protective layer (cover layer) 30 is porous (col. 4 line 34). Benzel et al. does not teach the sacrificial layer has a decomposition temperature less than a decomposition temperature of the substrate and a decomposition of the protective layer. Barth et al. teaches the sacrificial layer has a decomposition temperature less than a decomposition temperature of the substrate (cavity) (paragraph [0062]) and a decomposition temperature of the protective layer (cover layer) (paragraph [0026]). Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. with the teachings of Barth et al. to use a sacrificial layer which has a decomposition temperature less than the decomposition temperature of the substrate and

protective layer for the purpose of making cavity without damaging the protective layer and the substrate.

Regarding claim 27, Figure 1c of Benzel et al. teaches the substrate layer 10 comprises silicon material (col. 4 line 13).

Regarding claim 28, Figure 1c of Benzel et al. teaches the substrate layer 10 comprises non-silicon material (germanium) (col. 7 lines 52-53).

Regarding claim 30, Figure 1c of Benzel et al teaches the protective layer (sealing layer) 30 has not been perforated (hermetically sealed) (col. 6 lines17-18).

Regarding claim 31, Figure 1c of Benzel et al. teaches the protective layer 30 is porous (co. 4 lines 62-67) , therefore the protective layer is considered substantially free of sacrificial material.

Regarding claim 32, Figure 1c Benzel et al. teaches the protective layer 75 provides an air tight (vacuum tight seal) enclosure around the gas cavity 50 (col. 5 line 1)..

Claims 29,33-37,40-42, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benzel et al. in view of Barth et al. as applied to claim 24 above, and further in view of Cheung (US 6,936,494).

Regarding claim 29, Benzel et al. and Barth et al. teach all the claimed inventions as applied to claim 24 above. Benzel et al. and Barth et al. do not teach the thickness of the protective layer is within the range of 50nm and

500um. Cheung teaches the thickness of the protective layer (support layer) 38 can be 1um. Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. and Barth et al. with the teachings of Cheung to form a protective layer with a thickness of 1um in order to protect the device from external force

Regarding claim 33, the limitation "the protective layer provides protection from mechanical forces" is merely a functional/intended use limitation that does not structurally distinguish the claimed invention over the prior art. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure than function. *In re Schreiber,* 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-31 (Fed. Cir. 1997).

Regarding claim 34, the limitation "the protective layer further provides protection against water" is merely a functional/intended use limitation that does not structurally distinguish the claimed invention over the prior art. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure than function. *In re Schreiber,* 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-31 (Fed. Cir. 1997).

Regarding claim 35, the limitation " the protective layer further provides protection against oxygen gas" is merely a functional/intended use limitation that does not structurally distinguish the claimed invention over the prior art. While

features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure than function. *In re Schreiber,* 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-31 (Fed. Cir. 1997).

Regarding claim 36, the limitation " the protective layer further provides protection against exposure to gaseous materials" is merely a functional/intended use limitation that does not structurally distinguish the claimed invention over the prior art. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure than function. *In re Schreiber,* 128 F.3d 1473, 1477-78, 44 USPQ2d 1429,1431-31 (Fed. Cir. 1997).

Regarding claim 37, Benzel et al. and Barth et al. teach all the claimed inventions as applied to claim 24 above teaches all the claimed inventions as applied to claim 24. Benzel et al. and Barth do not teach the micro electro-mechanical device includes a released mechanical structure before the sacrificial material is formed. Figure 1A (step 10 and 12) of Cheung teaches forming a microscopic structure (MEMS) (col. 6 lines 1-5) then forming a capping layer 12 comprising sacrificial material. Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. and Barth et al. with the teachings of Cheung to form the released mechanical structure before the sacrificial material is formed for the purpose of reducing process steps.

Regarding claim 40 and 41, Benzel et al. teaches forming a barrier layer 75 around the protective layer (silicon) 30 (col. 4 lines 62-63), the barrier layer providing stronger protection against mechanical forces because the barrier layer comprises metal material (col. 4 lines 64-67). .

Regarding claim 42, Benzel et al. and Barth et al. teach all the claimed inventions as applied to claim 24 above. Benzel et al teach the method of creating a vacuum inside the gas cavity by heating the micro-electro mechanical device (col. 5 line 5). Benzel et al. and Barth et al. do not teach creating a vacuum in a chamber and after the vacuum is created, forming a barrier layer around the protective layer. Figure 8 of Cheung teaches forming a barrier layer 46 around the protective layer 38 with in the chamber (oven) (col. 8 lines 32-37) the barrier layer comprising a metal layer (col. 4 lines 44-50). Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. and Barth et al. with the teachings of Cheung to form a metal barrier layer around the protective layer after forming vacuum around the gas cavity for the purpose of facilitating the out gassing of interior surface.

Regarding claim 46, Benzel et al teaches all the claimed inventions as applied to claim 42 and 40 above. Benzel et al does not teach the method of thermally decomposing the sacrificial layer inside the vacuum chamber. Figure 1E of Barth et al teaches the method of decomposing the sacrificial layer 112 (paragraph [0062]) inside the vacuum chamber (paragraph [0028]). Therefore in view of such teachings it would have been obvious to one ordinary skill in the art

at the time the invention was made to modify the teachings of Benzel et al. with the teachings of Barth et al. to thermally decompose the sacrificial layer inside vacuum chamber for the purpose of forming particle free cavity.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Benzel et al. in view of Dunn et al. (US 7,078,796.

Regarding claim 14, Figure 1c of Benzel et al. teaches all the claimed inventions as applied to claim 1 and 13 above. Benzel et al. does not teach a metal packaging frame attached to micro electro-mechanical device and a coating material encapsulating a portion of micro electro-mechanical device and metal packaging frame assembly. Figure 2 and 3 of Dunn et al. teaches a metal packaging frame 252 (col. 7 lines 5-8) a micro electro-mechanical device 312 (col.7 Lines 56-60) being attached to the metal packaging frame 252 and a coating material (silicon gel) 254 encapsulating a portion of the micro electro-mechanical device and metal packaging assembly. Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. with the teachings of Dunn et al. to form a metal packaging frame attached to micro electro-mechanical device and a coating material encapsulating a portion of the micro electro-mechanical device and metal packaging frame assembly for the propose of forming robust hermetic seal frame.

Claim 21-23 is rejected under 35 U.S.C 103 (a) as being unpatentable over Benzel et al. in view of Barth et al. as applied to claim 15 above, and in further view of Dunn et al. (US 7,078,796) , and Yao et al. (6617657).

Regarding claim 21 and 22, Figure 1c of Benzel et al. teaches all the claimed inventions as applied to claim 15 above. Benzel et al. does not teach a metal packaging frame, a coating material comprising an epoxy resin encapsulating a portion of micro electro-mechanical device and metal packaging assembly, the coating material being permeable to the decomposition of gases produced by the decomposition of sacrificial polymer at a temperature exceeding a curing temperature of the coating material. However Figure 2 of Dunn et al. teaches a coating material 254 (silicon gel) encapsulating a portion of the micro-electro-mechanical device and metal packaging (252) frame assembly. Barth et al. teaches a coating material (polybenzoxazole) 124 (paragraph [0062] including the characteristics of being permeable of a sacrificial polymer 112 and a thermally decomposition gases produced by the decomposition of sacrificial polymer. Figure 1 of Yao et al. teaches in micro electro mechanical device manufacturing an epoxy layer 104 and 112 (col. 5 lines 25-35) once cured is able to withstand elevated temperatures. Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. with the teachings of Dunn et al., Yao et al. and Barth et al. to form a micro electro-mechanical device being attached to the metal packaging frame, an epoxy coating material encapsulating the micro electro-mechanical device and metal packaging frame, a coating

material being permeable to the decomposition of sacrificial polymer at a temperature exceeding a curing temperature of the coating material for the purpose of making residue free cavity with a robust packaging.

Regarding claim 23, Figure 1c of Benzel et al. teaches an overcoat structure 30 and 75 (oxide or nitride) comprising a modular polymer that includes of being permeable (porous) (col.4 lines 62-67) and a cavity 50. Benzel et al. does not teach the decomposition of gases produced by the decomposition of a sacrificial polymer from the inside the gas cavity. However Barth et al. teaches a decomposition of gases produced by the decomposition of sacrificial polymer 112 from inside the gas cavity (paragraph [0050]). Therefore it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. with the teachings of Barth et al. to form the gas cavity by decomposing a sacrificial polymer for the purpose of forming residue free gas cavity.

Claim 38 is rejected under 35 U.S.C 103 (a) as being unpatentable over Benzel et al. in view Barth as applied to claim 24 above, and in further view of Lin et al. (US6,953,985).

Regarding claim 38, Benzel et al. teaches all the claimed inventions as applied to claim 24 above. Benzel et al. does not teach before the protective layer is formed attaching the micro electro-mechanical device to a metal packaging frame where in the protective layer comprises epoxy. Lin et al.

teaches in MEMS device manufacturing before the protective layer (epoxy) (col. 19 lines 36-38) is formed, attaching the micro electro-mechanical device to a metal packaging frame, where in the protective layer comprises an epoxy resin encapsulating the micro electro-mechanical device (col.12 lines 62-64) and metal packaging frame assembly (col. 16 lines 36-38).

Regarding claim 39, Benzel et al and Lin et al . teach all the claimed inventions as applied to claim 38 above. Benzel et al. and Lin et al. do not teach heating the micro assembly at a temperature for curing the protective layer and for decomposing the sacrificial layer exceeding the temperature for curing protective layer. Barth et al. teaches the sacrificial layer has a decomposition temperature less than the decomposition temperature of the protective layer (cover layer) (paragraph [0026]). Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. and Lin et al. with the teachings of Barth et al. to use a sacrificial layer which has a decomposition temperature exceeding the curing temperature of the protective layer for the purpose of making curing the protective layer and at the same time decomposing the sacrificial layer.

Claims 47-50 are rejected under 35 U.S.C 103 (a) as being unpatentable over Benzel et al. in view of Barth et al. (2006/0014374) as applied to claim 24 above, and further in view of Dunn et al. (US 7,078,796).

Regarding claim 47, Benzel et al. teaches all the claimed inventions as applied to claim 24. Benzel et al. does not teach after the sacrificial layer is decomposed, attaching the micro electro-mechanical device to an integrated circuit package structure and encapsulating the device and package structure in a protective coating. Barth et al. teaches decomposing the sacrificial layer. Dunn et al. teaches attaching the micro-electro-mechanical device to an integrated circuit package structure 252 (lead frame) (col. 7 lines 6-10); and encapsulating (col. 16 lines 65-68) the electro-mechanical device and integrated circuit package structure comprising ceramic package (col.4 lines 40-43) in a protective coating (silicon gel). Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. with the teachings of Dunn et al. and Barth et al. after the sacrificial layer is decomposed attaching the micro electro-mechanical device to an integrated circuit package structure and encapsulating the device and package structure in a protective coating for the purpose of forming a cavity free or residue prior to sealing the MEMS device.

Regarding claim 48 and 49, Benzel et al. and Barth et al teach all the clamed inventions as applied to claim 24, and 47 above. Benzel et al. and Barth et al. do not teach the method where in the integrated circuit package structure comprises a leadframe and ceramic package. Figure 1 of Dunn et al. teaches the integrated circuit package structure 252 comprises a (lead frame) (col. 7 lines 6-10); and a ceramic package (col.4 lines 40-43). Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time

the invention was made to modify the teachings of Benzel et al. , Barth et al. and with the teachings of Dunn et al. to form an integrated package structure comprising lead frame and ceramic package for the purpose of forming electrical connectivity between the MEMS device to provide additional mechanical and environmental protection.

Regarding claim 50, Benzel et al. teaches all the claimed inventions as applied to claim 24. Benzel et al. does not teach the thermal decomposition temperature of the sacrificial material is less than 100 degrees Celsius. Dunn et al teaches the temperature range for the sacrificial layer decomposition is from 250 to 400 and the covering layer is permeable and is designed to withstand the temperature. Moreover, there is no evidence that indicates the thermal decomposition temperature of the sacrificial layer to be less than 100 degrees Celsius is critical and it has been held that it is not inventive to discover the optimum workable temperature of a result-effective variable with given prior art conditions by routine experimentation. See MPEP 2144.05 Note that the specification contains no disclosure the critical nature the claimed height of any unexpected results there from.

Claims 43-45 are rejected under 35 U.S.C 103(a) as being unpatentable over Benzel et al. , Barth et al, and Cheung as applied to claim 24 and 42 above in view of Dunn et al (US 7,078,796)

Regarding claim 43-45, Benzel et al. , Barth et al and Cheung teach all the clamed inventions as applied to claim 24, 42, above. Benzel et al. , Barth et al. and Cheung do not teach the method after barrier layer is formed attaching the micro electro-mechanical device to an integrated circuit package structure; and encapsulating the device and integrated circuit package comprising lead frame and ceramic package in a protective coating. Figure 1 of Dunn et al. teaches attaching the micro-electro-mechanical device to an integrated circuit package structure 252 (lead frame) (col. 7 lines 6-10); and encapsulating (col. 16 lines 65-68) the electro-mechanical device and integrated circuit package structure comprising ceramic package (col.4 lines 40-43). Therefore in view of such teachings it would have been obvious to one ordinary skill in the art at the time the invention was made to modify the teachings of Benzel et al. , Barth et al. and Cheung with the teachings of Dunn et al. to attach the micro electro-mechanical device to an integrated package structure comprising lead frame and ceramic package for the purpose of forming electrical connectivity between the MEMS device and external power supplies and signals and to provide additional mechanical and environmental protection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YOSEF GEBREYESUS whose telephone

number is (571)270-5765. The examiner can normally be reached on Monday through Thursday 7:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Landau can be reached on 571-272-1731. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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